



THE WORLD BANK in Laos



NAM THEUN 2 Making a Difference

Overview

On April 30th, 2010, The Nam Theun 2 (NT2) hydroelectric project began its commercial operations. Officially, NT2 got underway in March 2005, but the original idea for such a project came from an article published in 1927 in the French journal *L'Eveil Economique de l'Indochine*. The author, H. Cucherousset, the editor of the journal, recognized that certain unique features could make it an ideal site for a hydropower dam, including especially the presence of two plateaus, the Nakai and Mekong, one 350m above the other. The difference in altitude can be used to create electricity. Another unique feature is that building a relatively small dam wall at one end of the Nakai plateau could create a huge reservoir to extract water from out the other end. In 1927, he predicted that one day Thailand would have many large cities, creating a demand for imported power and that the income

generated for Laos would make for a huge economic stimulus for the area around the hydropower facility and for the country. All these ideas have become a reality 80 years later.

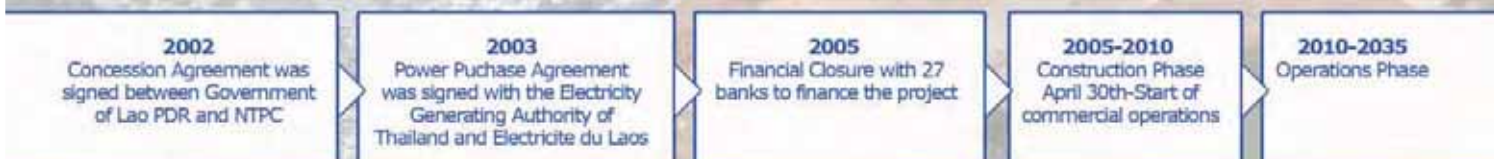
The hydropower station is now built and electricity is generated, but the journey so far has not been an easy one. Initial designs began in 1993-1996, but due to the Asian Financial Crisis and the need to improve the environmental and social assessment of the project, the project stalled. Initial geological, topographic, wildlife and vegetation surveys were done at this time. The community consultations phase also began in 1996. The years 2000-2005 saw the beginning of the development phase for NT2. In 2002, the Nam Theun 2 Power Company (NTPC) was created, formed by the Government of Lao PDR and private shareholders. NTPC shareholders include:

- 35% Electricité de France (EDF)
- 25% Electricity Generating

- Public Company Limited (Thailand) (EGCO), which is partly a subsidiary of the end user Electricity Generating Authority of Thailand (EGAT)
- 25% Government of Lao (Government of Lao PDR)
- 15% Italian-Thai Development Public Company Limited (Thailand) (ITD)

The past 15 years has seen a dramatic change in the capacity and policy around hydropower development in the Government of Lao PDR. Prior to NT2 the Government of Lao PDR didn't have guidelines on environmental standards, social considerations and technical standards for hydropower facilities. The government unit that dealt with hydropower facilities was an ad hoc committee called the Lao National Committee of Energy. This was upgraded to a full Ministry in 2007, the Ministry of Energy and Mines.

A summary of the timeline along which NT2 was developing is below and represents the main milestones of the project.



The Hydropower Facility

Construction began in 2005 on the 1,070 megawatt (MW) trans-basin hydropower scheme in Khammouane province. NT2 is designed as a build-own-operate-transfer (BOOT) project.

The concrete gravity dam is 39m high and 436km long and impounds the water of the Nam Theun River. The dam creates a 450km² reservoir with 3,530 million cubic meters of active storage, meaning water that can be used for generating purposes. The Nam Theun River has an average flow of 7.5 million cubic meters of water each year. The reservoir capacity is 3.9 million m³ and can be filled easily during wet season.

controls releases into the natural river system. The water released from the regulating dam flows down a 27km man-made channel via the Nam Phit River, directly to the Xe Bang Fai River, entering 9.5km upstream from Mahaxai town and 159km upstream from the confluence with the Mekong River. The Power Station is located at the foot of the escarpment of the Nakai Plateau in the Nam Kathang Valley. It is equipped with four 250MW Francis Unit turbines that can provide EGAT with 995MW or 5,636 GWh of electricity each year. It also has two 43MW Pelton Unit turbines that can provide Electricite Du Laos with 75MW or 300 GWh of electricity each year, as well as covering all internal power station needs.

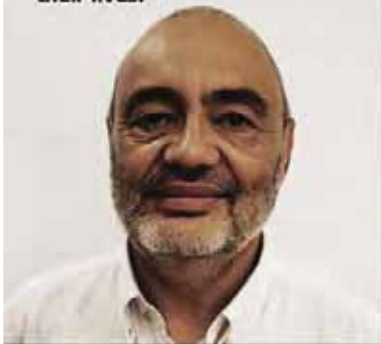
A 138km double-circuit 500kV transmission line has been constructed from the power station to the border near Savannakhet to deliver electricity to Thailand. Electricity generated for Laos via the Pelton turbines is delivered via a 70km long 115kV transmission line to Thakhek. EDL will also take up to 15 MW of energy from the power station switchyard via 22 kV lines to the resettlement villages.

Construction is complete and the Head Contractor officially handed the dam over to NTPC to manage and operate for the next 25 years.

"NT2 is important for the people of Laos as it creates tremendous benefits at the national and local levels"

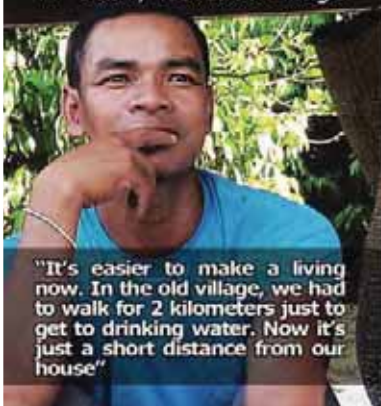


"People of Nakai, for the first time, have good schools, clinics, rice mills, electricity and water supply. They are healthier, stronger and have many more possibilities in their lives."



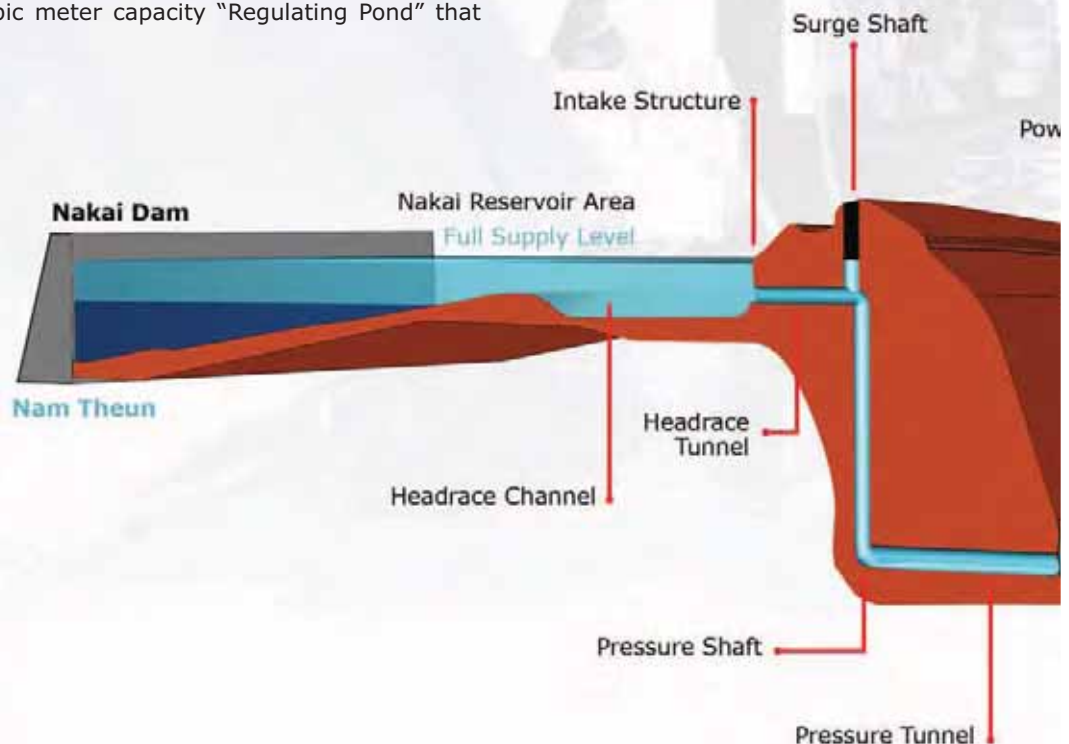
Mr Jean-Piere Katz,
CEO of the Nam Theun
Power Company

Mr Souk, resettled villager



"It's easier to make a living now. In the old village, we had to walk for 2 kilometers just to get to drinking water. Now it's just a short distance from our house"

Water is extracted via a 5km headrace channel excavated in the reservoir floor. The intake is at the opposite end of the reservoir to the dam wall. From the intake structure, water flows 3km down the headrace tunnel through the Phu Ark Mountain to the power station. It then passes through the turbines to the 8 million cubic meter capacity "Regulating Pond" that





The Nakai Plateau

The damming of the Nam Theun River and the creation of the reservoir flooded large areas of the plateau. While the optimal site and size of dam wall were well chosen to minimize environmental and social impact, it was nonetheless necessary to physically relocate approximately 6,300 inhabitants.

The pre-resettlement consultation aimed to inform affected people about NT2 project development plans, potential environmental and social impacts, and mitigation measures to address the identified impacts. This process allowed affected people a way to voice their concerns and have them incorporated into the resettle-



Farming

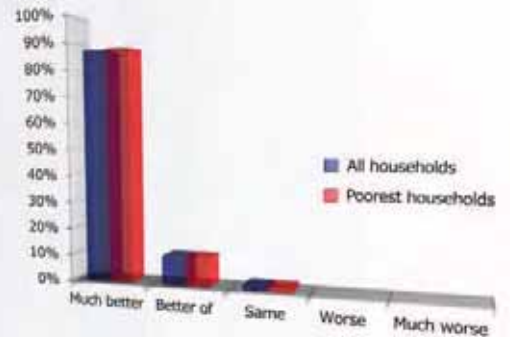
ment planning. It also helped to establish community support for the NT2 project and resettlement implementation. Initial planning for relocation started as early as 1997. It was essential, first, to understand the pre-relocation livelihood base of affected people. Baselines measured household size, livelihood options, asset ownership, food sources and seasonal food security, as well as the different skills, needs and resources of different households. In

2005, detailed consultation, community outreach, and planning were started to determine where people would be resettled.

Design of new houses and village layouts were made together with the affected villagers. And patterns of livelihood support and opportunities began to be identified. Villagers choose the Lao Loum style of house design, with stilts built out of quality hardwood timber. The size of each house was determined by the number of family members. Each house was provided with clean water access, electricity, and toilets. The project is providing a 0.626 hectare agricultural plot with irrigation available for each household. The irrigation schemes are under construction and will be finalized shortly. Today, each of the resettled villages has a school, kindergarten, a multi-purpose community building (including a market, rice mill, and village meeting hall), access to health facilities, and new all-weather roads.

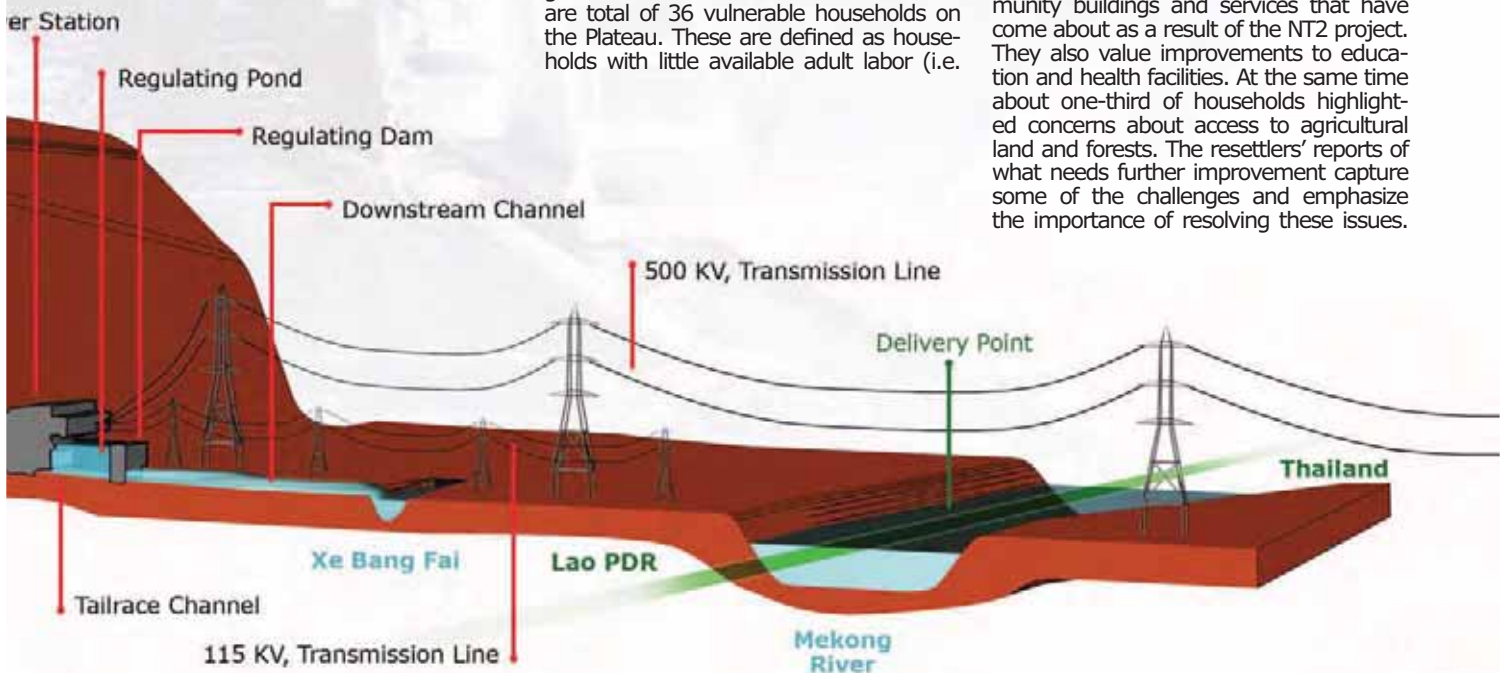
NTPC has made a commitment to double the income of every family within 5 years of resettlement. Validating this commitment is clearly one of the main priorities. Prior to the NT2 project, many of the plateau inhabitants were semi-nomadic and lived off the land, so resettlement involved considerable cultural adaptation. Now that all households have been resettled and the reservoir is effectively full, the focus for the affected communities has shifted towards building sustainable livelihoods. Activities based on agriculture, livestock, fisheries, forestry and off-farm opportunities have been initiated to achieve better quality of life for those who have been resettled. The post-relocation livelihood program was also designed in consultation with the affected villagers, taking into consideration the natural resources available to them, their skills, traditions and previous livelihood patterns. In addition, special attention is given to vulnerable households. There are total of 36 vulnerable households on the Plateau. These are defined as households with little available adult labor (i.e.

female headed households with young children to care for), or suffering chronic illnesses or members of historically disadvantaged ethnic minorities. These families continue to receive rice and protein supplements. The vulnerable households remain a focus of attention given their obvious challenges to raise themselves up to the progress of the non-vulnerable. Socioeconomic monitoring surveys conducted among resettled people on the plateau show that resettled people are



becoming better off following resettlement. Not only do people have better housing, roads, water supply, and access to health and education, but the majority of people also currently have higher incomes and consumption in comparison to their baseline situation. The simplest measure of resettler welfare is their own views, which are summarized in the chart above. (For more information and to hear Voices of Nakai people, please visit NT2 webpage at www.worldbank.org/laont2)

Villagers from vulnerable groups tended to rate the change even more positively than their better-off neighbors, with 88% saying that life was "much better" after resettlement. Households were asked to list up to two things that had gotten better and two things that had gotten worse on the plateau. Most appreciated improvements to housing, roads, community buildings and services that have come about as a result of the NT2 project. They also value improvements to education and health facilities. At the same time about one-third of households highlighted concerns about access to agricultural land and forests. The resettlers' reports of what needs further improvement capture some of the challenges and emphasize the importance of resolving these issues.

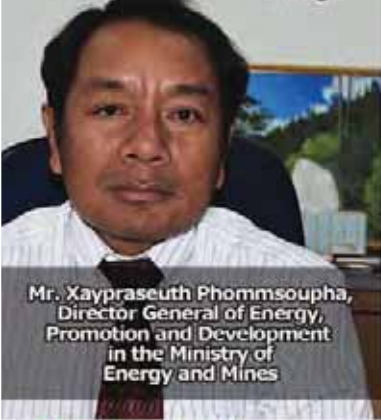


"It is our priority to help people of Nakai with their new livelihood issues and to create employment in a way that will make their living conditions stable and sustainable"



Mr. Khambay Damlath,
Governor of Khammouane
Province

"NT2 has been a catalyst for change"



Mr. Xaypraseuth Phommouphou,
Director General of Energy,
Promotion and Development
in the Ministry of
Energy and Mines

Mrs. Gnomany, resettled villager



"Life is very different now. Everything changed, the roads, the houses. Our whole life has changed"

"NT2 is making a difference to the people of this country"



Mr. Patchamuthu Illangovan,
Country Manager,
The World Bank, Lao PDR

The Downstream

Nakai Dam Downstream

With the Nakai Dam wall complete in April 2008, a diversion channel was built to take water around the dam wall. When the channel was closed the Nakai Reservoir was allowed to fill.

The flows of the Nam Theun River have been measured, either directly or indirectly, since 1950. Records show an average flow of 7.5 billion cubic meters of water each year. Based on the statistics available, the water flows of the Nam Theun were greater than the reservoir's total capacity in 49 out of the 50 years since records began, meaning that the water flows of the Nam Theun would have filled the reservoir's "active capacity" (i.e. the water volume that can be used for generating purposes) in just one year. There are no permanent settlements or established villages along this reach of the river, but some households (around 415) from the 38 nearby villages occasionally use it for fishing. Environmental and socio-economic impacts are expected in this area. The impact of a greatly reduced flow on the stretch of the river below the dam will have a significant effect on river processes. It is assumed that most of the current fish population will disappear, due to the changes in hydrology and hence in natural habitats. Socio-economic impacts are likely for villages that use the area for fishing.

Environmental mitigation is proposed through guaranteed minimum riparian releases (2m³/s) and supplemental spillage during the wet season. NTPC is taking an adaptive management approach to the issue, which will provide some opportunity to refine riparian flows through dam operations. Agreed compensation framework and program has been discussed delivered to the affected villagers.

In 2007, the International Financial Institutions (IFIs) recommended that NTPC develop a plan to provide emergency food support to prepare for the possibility of a short term negative impact from the discharge of poor quality water (from decomposition of biomass in the newly-formed reservoir). A monitoring program was put in place to check on negative impacts in the 37 villages downstream from the dam. So far, there has been no need to activate the Emergency Contingency Protein Replacement Program.

Grant-based investments are underway in these villages as part of the compensation program, and the nature of the investments – ranging from fish ponds to paddy land development – depends on the community's preferences. The focus is on helping them diversify their income-generating activities to lessen the potential impact of losing fish.

Since 2008, the fish catch of households in 51 target villages have been recorded. The fish catch data is being recorded by an NGO, Digital Divide Data, and the NTPC Downstream staff. The aim is to establish a long-term baseline in target areas to monitor changes in fish catch. Water quality is also assessed by automated water quality monitoring stations downstream of the Nam Theun dam.

Xe Bang Fai Downstream

Now that the turbines are running, the Xe Bang Fai downstream is being impacted. The full nature and extend of these impacts will only be clear after several seasons. Monitoring is in place to ensure that emerging impacts are satisfactory addressed.

The Xe Bang Fai is 386km long, from its source on the border between Laos and Vietnam to its confluence with the Mekong River. A total of 89 villages, located on the section of the Xe Bang Fai, are impacted in some way by the NT2 project. Also, 69 non-mainstream villages (hinterland villages) in which some of the households travel to the Xe Bang Fai to catch fish or collect aquatic products, are also indirectly impacted.

The release of reservoir waters into the Xe Bang Fai still modifies its ecosystem and geomorphology, despite first being discharged into a 27 km man-made channel. Possible negative effects include erosion of banks causing the loss of riverside gardens and riverside buildings, a potential decrease in fish numbers and related aquatic life, and altered water quality in the river. People may be unable to use the river water for domestic purposes, but higher water tables are already assisting well water extraction. On the positive side, considerably more water will be available for irrigation during the dry season. Higher flows in the dry season will make crossing more challenging, but boat navigation will improve and increased discharge may lead to increased flooding of the lower Xe Bang Fai.

For all these reasons, the project created a downstream program – a relatively new approach in hydropower projects design. The program includes infrastructure provision, livelihood restoration, a Fish Catch Monitoring (FCM) Program, water quality and socio-economic surveys, and registration of riverbank gardens and compensation program. A quick review of these components shows that the infrastructure provision includes a variety of subcomponents. Under the water supply, sanitation, and hygiene (WASH) program, to provide alternate water supply, boreholes with pumps and dug wells have already been constructed. Toilets have been constructed in households and schools. An awareness raising



program on health and sanitation was conducted. All of the 535 boreholes and pumps planned have been provided to villages along the Xe Bang Fai. Most of these boreholes provide a reliable source of clean water suitable for domestic use.

Under Flood gate rehabilitation, to mitigate future flooding, flood gates have been rehabilitated. Other elements of the program include access restoration, river bank garden replacement, river bank protection, and UXO clearance.

To help villages cope with the changing environment, the Alternative Livelihood Development Program was developed and trialed in 20 pilot villages. The pro-

gram was designed to provide investment activities to compensate for fishery losses. This has since been scaled up to the remaining affected villages. Villages tested the use of revolving funds to provide micro-credit for different types of income-generating activities (e.g. horticulture, including vegetables, and fruits, aquaculture, irrigated rice, animal husbandry and cottage industries). The program was accelerated during 2009 and 2010 to cover all villages along the Xe Bang Fai. Initial assessment of the savings and credit scheme showed solid participation rates and repayment levels

of 90% with more than 40% of the poorest villagers participating in the program. To establish a long-term baseline of fish catch in target areas, a Fish Catch Monitoring program has been in place since 2007. This will enable any changes in fish catch over time to be observed and acted upon.

Water quality is another component that has been regularly assessed since January 2005 on the Xe Bang Fai. In addition, a Socio-economic monitoring survey was conducted in 2001, to serve as the baseline for the upcoming monitoring data analysis.

Registration of river bank gardens has been finalized and implementation is being accelerated from the original schedule. Based on the data collected during the process of riverbank garden registration, no household in any village is expected to lose more than 10 percent of its annual total livelihood through project impacts on riverbank gardens. The villagers were informed ahead of the impacts and have largely restricted this season's gardens to land above the new water level.

Protecting the Watershed





Concern for the protection of the Nam Theun watershed led the NT2 project principals to the decision to pay for its current and future management. To do this the Nam Theun 2 Watershed Management and Protection Authority (WMPA) was formed. NTPC has agreed to provide the US \$1 million per year for the next 31 years to fund its activities. The Nakai Nam Theun National Protected Area (NNT NPA) is not only the largest of Lao PDR's twenty national protected areas, it is without doubt the most important for biodiversity conservation and one of the most important protected inland areas in Asia.

The details of the management of the 4,100km² NPA were described in the Social and Environment Management Framework and Operation Plan (SEMPOP) released in January 2005. Its purpose is to ensure the long term protection of the biodiversity and watershed values of the Nakai Nam Theun National Protected Area (NNT NPA), while at the same time safeguarding the well-being, traditional livelihoods and culture of its human inhabitants.

To do this the WMPA works with local communities to implement a range of programs to protect the watershed. These programs include: Forest and Land Use Planning, Allocation and Management at the village and NPA levels; Biodiversity Resource Survey, Monitoring, Research and Protection; and Village Livelihood and Social Development.

One of the more vulnerable groups in the NT2 project area are located in the NNT NPA. These people - hunter-gatherers - are the Vietic minorities. Some of these people live in small groups of foraging nomads, others practice slash and burn agriculture and move every 2-3 years whilst others are a combination of both. There are approximately 6,000 people living within NPA. As in other areas around the world, one of the main challenges facing the villages as well as the wildlife and forests is how they can all live side by side. In order to protect the NNT NPA the GoL plan to stop slash and burn agriculture and support the people to find new livelihoods.

Protection and conservation programs have been designed with the help of international organizations such as the Wildlife Conservation Society (WCS). To date the wildlife programs have performed well. Other successful elements of the program have included wildlife rescue (during reservoir creation and inundation), elephant management, creation of artificial wetlands, patrolling and enforcement and increasing public awareness of conservation and protection. The wildlife rescue program was completed in Feb 2009, but the monitoring of released wildlife will continue in the Watershed area. Significant numbers of rare and recently discovered species endemic to the area - like the Large Antlered Muntjac - were captured and released into appropriate areas, as well as numerous other species.

The area is not immune to threats to the biodiversity. From wildlife poaching from across the Vietnamese border and also from those in the peripheral impact zones on either side of the Watershed and resettled communities to illegal logging operations and the development of mining concessions that have the potential to create social and environmental impacts on both the downstream and watershed areas. Perhaps these are the most significant challenges to overcome and the generations to come will be the witnesses of a job well done.



Revenue Management

The reforms achieved through the Government's Public Financial Management Strengthening Program are strengthening fiduciary capacity and have facilitated NT2 Revenue Management Arrangements (NT2-RMA). The implementation of revenue management arrangements have helped Lao to put in place tools for transparent and accountable management of public resources. Implementation of the revenue management arrangements have allowed the Government to implement the budget classification and monitoring system capable of reporting physical progress of expenditures, and the State Audit Organization is building capacity to conduct performance audits. The government has also implemented a Treasury Single Account. **The Government has received**

close to US\$ 1.5 million as revenue from NT2 by July 2010. NT2 commenced operations in April 2010 and these revenues follow the agreed billing cycle. The funds were transferred by NTPC to the Bank of Lao PDR, which in turn deposited the money into the National Treasury Account. Government has made allocations for eligible expenditures across health, education, rural roads, rural electrification and environment. **With the NT2-RMA now in place, and eligible programs identified, the focus is now on refining reporting modalities and coordination mechanism.** Implementation of the program has already started. The involved agencies are maintaining detailed information on the physical progress of the projects and have been regularly reporting on the

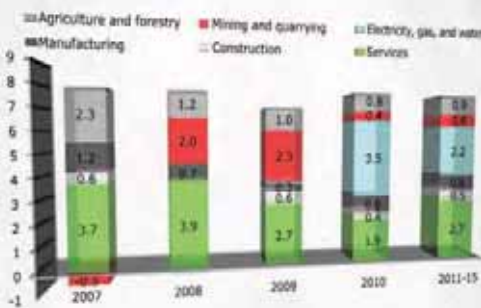
projects to the Ministry of Finance (MOF). Looking ahead, as per the NT2 RMA, the MOF will need the report on the application of the NT2 revenues in December 2010 (six months after revenues start flowing into the budget system). The reporting for mat and coverage is under discussion. Furthermore, it will be important to maintain focus on assuring "additionality" particularly in the case of social sectors which have historical experienced fluctuations in recurrent budgets as a percent of the total recurrent budget. At the same time, internal coordination mechanism between MOF, the Ministry of Planning and Investment (MPI), sector ministries, and the State Audit Office need to be formalized to ensure that all respective agencies remain current on the requirements and commitments within the NT2 RMAs.

Lao PDR Economic Monitor

A large increase in government spending and sustained demand for Lao's exports from countries in the region helped the economy weather the economic and financial crisis.

growth and strong revenues, the overall budget deficit is expected to decrease to 4.5% of GDP in FY2010 from 6.8% in FY2009.

particular NT2 exports of electricity to Thailand. The overall balance is likely to turn into surplus in 2010 to about 2.4% of GDP.



The headline inflation has risen in recent months largely due to recent recovery of energy (fuel) and food prices. The year-on-year inflation has increased notably in recent months to 4.8% in April 2010 from 1.5% in November 2009. The averaged inflation is projected at around 5% in 2010 (currently at 4.7%). After maintaining a de facto peg of the kip to the US dollar in 2009 and early 2010, Bank of Lao PDR (BoL) has allowed the kip to appreciate against the dollar, resulting in monthly appreciation of the kip by 2.1% against the US dollar and 0.9% against the baht in April 2010.

Credit grew rapidly in 2009 but is expected to slow by end-2010. Credits grew by about 90% last year partly due to BoL's direct lending to local projects to finance public infrastructure and associated imports (about 22 percentage points of total credit growth). As the GoL made a decision to stop quasi-fiscal activities in September 2009 and bank liquidity tightened, credit growth is expected to slow in 2010. Although non performing loans (NPLs) have declined during the last two years, largely because of rapid credit growth, risks in the sector remain significant in the context of relaxed bank supervision.

Real GDP growth, estimated at 7% in 2009, is expected to increase to 7.8% in 2010 driven largely by resource sectors. Real gross national income (GNI) is expected to slow to nearly 6% this year compared to 9.5% in 2009 due to significant outflows of income (profit repatriation and interest payment) from resources sectors (mining and hydropower).

Although international reserves remained fairly stable during the last six months, net foreign assets dropped by 25%. Gross Official Reserves at the BoL were estimated at about \$635 million during Oct 2009 Mar 2010. The current account deficit is projected to decline from 10.6% of GDP in 2009 to 7.7% in 2010 supported by strong export growth, and in

Fiscal performance is on track toward achieving the Government of Lao PDR targets in FY2010. With projected sustained economic

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